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ABSTRACT

In an effort to improve college program planning using data on the computer skills of entering freshmen, a survey was conducted to obtain information about computer science programs in Pennsylvania's public schools. The study investigated the material being taught, the background of computer science teachers, program plans, tendencies in the acquisition of hardware and software, the programming languages being taught, and the students receiving computer science instruction. Study findings, based on responses from 220 districts across the state, revealed: (1) 36.9% of the districts used Apple computers, and 44.6% expected to be using Apples the following year; (2) 23.6% of the elementary students, 42.8% of the middle school students, and 51.9% of the high school students were receiving computer science instruction; (3) the most commonly used programming language was BASIC; (4) 22.8% of the districts were currently teaching Pascal, and 33.2% planning to begin teaching the language within the next 2 years; (5) 54.6% of the districts taught structured programming; (6) of the computer science instructors, 35.3% had only undergraduate credits, 20.6% had only graduate credits, and 31.6% had both graduate and undergraduate credits in computer science; (7) 43.2% of the district had an organized, documented plan for computer usage; and (8) 75.5% of the districts used little or none of their computer capabilities for administrative purposes. (HB)

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COMPUTER LITERACY OF ENTERING FRESHMEN

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COMPUTER LITERACY OF ENTERING FRESHMEN

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This survey was done to gather information about programs that are underway in Pennsylvania's public schools in the area of computer science. Some of the items addressed were as follows: 1) what material is being taught 2) what is the background of teachers who are teaching computer science 3) are program plans documented 4) future plans 5) tendencies in the acquisition of hardware and software 6) languages being taught 7) what students are getting computer science instruction. With this information, it may be easier for a post secondary school in Pennsylvania to make decisions about: 1) course content of entry level courses 2) designing advanced placement tests 3) selection of hardware 4) course offerings for secondary teachers 5) areas where secondary schools might need professional guidance, etc.

The results represent percentages and totals based on responses of 220 different districts across the state. The survey consisted of 16 multi-answer questions. Those questions and the results follow:

1) What type of hardward does your district have at each level?

Elementary	type	quantity now	quantity next year
	APPLE	*36.9%	**44.6%
	ATARI	12.3	10.5
	COMMODORE	11.5	9.8
	TI	11.8	9.6
	TRS	26.5	24.0
	OTHER	1.0	1.5

*of the total number of computers reported, 36.9% were APPLE.

**of the total expected number of computers reported for next year, 44.6% were APPLE.

Middle	type	quantity now	quantity next year
	APPLE	26.1%	30.7%
	ATARI	2.4	2.5
	COMMODORE	21.0	19.9
	TI	1.6	1.3
	TRS	47.8	44.5
	OTHER	1.1	1.1

High School	type	quantity now	quantity next year
	APPLE	38.5%	41.0%
	ATARI	2.8	2.3
	COMMODORE	13.5	12.2
	IBM	2.5	2.7
	TI	0.1	0.1
	TRS	35.9	35.7
	*TERMINALS	3.9	3.6
	OTHER	2.8	2.4

*connected to mini or mainframe

2) What type of students get computer science instruction and how much, at each level? (not CAI)

Elementary	type	.1-.5 sem	1 sem	2 sem	3-4 sem
	ALL	17.3%	3.6%	1.8%	0.9%
	GIFTED	8.2	2.7	3.2	0.0
	REMEDIAL	1.4	0.9	0.5	0.0

54.5% of those responding said they had no computer science instruction at this level.

Middle	type	.1-.5 sem	1 sem	2 sem	3-4 sem
	ALL	28.2%	10.0%	4.6%	0.0%
	GIFTED	4.1	4.1	3.2	0.5
	REMEDIAL	0.9	0.0	0.5	0.0

35.0% of those responding said they had no computer science instruction at this level.

High School	type	.1-.5 sem	1 sem	2 sem	3-4 sem	5-8 sem
	ALL	8.2%	14.1%	19.6%	5.9%	4.1%
	COL. PREP	0.0	15.0	23.2	10.0	3.2
	BUS	1.9	6.8	7.3	1.4	0.5
	GIFTED	0.0	1.9	1.9	0.5	0.0

0.9% of those repsonding said they had no computer science instruction at this level.

3) At the high school level (9-12), how many semesters of computer science are required vs available for each type of student?

Available	type	none	.1-2 sem	3-4 sem	5-8 sem
	VOC	44.6%	40.9%	9.1%	5.4%
	COL. PREP	0.9	59.1	24.6	16.4
	REMEDIAL	54.6	32.3	5.9	7.2
	BUS	31.4	52.7	10.9	5.0

Required	type	none	.1-2 sem	3-4 sem
	VOC	94.4%	5.6%	0.0%
	COL. PREP	93.2	6.8	0.0
	REMEDIAL	95.9	4.1	0.0
	BUS	92.7	7.3	0.0

4) What programming languages, if any are used at each level?

Elementary	Language	.1-5 sem	1 sem	2 or more sem
	LOGO	10.0%	0.5%	0.0%
	BASIC	26.8	3.2	2.3
Middle	Language	.1-.5 sem	1 sem	2 or more sem
	BASIC	32.3%	14.1%	3.6%
	ASSEMBLY	0.5	0.0	0.0
	PASCAL	0.5	0.0	0.0
	LOGO	2.7	0.9	0.0
High School	Language	.1-.5 sem	1 sem	2 or more sem
	BASIC	6.4%	36.8%	53.6%
	ASSEMBLY	2.7	1.8	0.0
	FORTRAN	6.8	10.0	5.0
	PASCAL	9.6	10.9	7.3
	COBOL	2.7	4.1	1.8

5) Do you have plans to teach Pascal? If yes, when and at what level?
If already teaching Pascal, how long and at what level?

Plans	yes, 84-85	yes 85-86	no
	(9-12)	(9-12)	
	25.0%	18.2%	34.1%
Already	for 1 year	for 2 years	for 3-5 years
Teaching	(9-12)	(9-12)	(9-12)
	20.5%	1.8%	0.5%

All but 1 of those with plans to teach Pascal said H.S. level.

All but 1 of those already teaching Pascal said H.S. level.

6) How many of your students plan to take the S.A.T. advanced placement test in computer science this year?

% answering none	# of students where Pascal is being taught	# of students where Pascal is not being taught
92.3%	205	53

7) Do you teach structured programming? (if unsure, do not respond)

yes	no	no response
54.6%	11.8%	33.6%

8) Do you offer courses in computer science other than programming courses i.e. architecture, data structures, literacy, etc.)

no	CAD-CAM	literacy	indep. study	other
90.5%	1.8%	4.1%	1.4%	2.2%

9) Do you plan to offer more courses? At what level and covering what material? % answering no was 27.7%.

Elementary	literacy	BASIC	LOGO	typing
	8.2%	2.7%	5.0%	0.5%
Middle	literacy	BASIC	FORTRAN	typing
	13.6%	9.6%	0.5%	1.4%
High School	literacy	BASIC-ALL students	Word Processing-ALL students	
	19.6%	14.1%	4.1%	
	COBOL	ASSEMBLY	Word Processing-Bus	Graphics
	5.5%	3.6%	3.2%	4.6%
	FORTRAN			
	4.1%			

10) How many people teach computer science at your school? What are their backgrounds in computer science?

# of people reported to be teaching computer science 607.

with only undergrad credits 214 (35.3% of 607)

with only graduate credits 125 (20.6% of 607)

with both undergrad and graduate credits 192 (31.6% of 607)

with no credits 76 (12.5% of 607)

Of those with only undergrad credits

1-6 credits	7-12 credits	13-24 credits
125(20.6% of 607)	69	20(3.3% of 607)

Of those with only graduate credits

1-6 credits	7-15 credits	15-30 credits
77(12.7% of 607)	40	8(1.3% of 607)

Of those with both types of credits

1-15 credits	16-24 credits	24+credits
130(21.4% of 607)	41	21(3.5% of 607)

11) Do your business students receive instruction in word processing?

% yes (.5-1 sem)	% yes (2 sem)	% yes (3-4 sem)	% no
60.0	25.0	0.5	14.5

12) Does your district have an organized, documented plan for computer usage?

% yes	% no
43.2	56.8

13) Where does your district get software?

Purchase over 50%	80.9%
Purchase over 75%	67.7%
Over 50% staff written	11.8%
Less than 10% staff written	51.8%
Over 5% student written	34.1%

14) Does your district have a method of informing faculty about possible uses of computers, how others are using computers, the latest software, etc.

% yes	% no
55.0	45.0

15) Does your district use its computer facilities for administrative purposes?

% little or none	% alot
75.5	*24.5

*many in this category said administration had their own machine.

16) Does your district receive direction, suggestions, news or any type of info/help for its computer science program from other organizations? Please list organizations.

% yes	% no
45.5	54.5

most frequently listed source in order of frequency I.V. (by far the most frequent)

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The following conclusions are based on the results above and the authors experience in public education in Pennsylvania and at the Pennsylvania State University.

In Pennsylvanias public schools districts:

1) APPLE appears to be the only manufacturer whose share of the market surveyed will rise for next year.
2) most elementary schools are not teaching computer science.
3) most middle schools are teaching computer science.
4) many high schools are teaching computer science to all their students, with emphasis on college prep students.
5) most high schools offer computer science to a wide range of students but few require it.
6) BASIC is by far the most popular language in use, but many high schools offer a variety of other languages.
7) most high schools are now teaching or have plans to teach Pascal.
8) very few districts have students planning to take the S.A.T. advanced placement test in computer science.
9) 53 students were reported to be taking the S.A.T. advanced placement test from schools not teaching Pascal.
10) most schools teach structured programming but many are uncertain.
11) few districts are teaching computer science other than programming.
12) most districts are planning to offer more courses.
13) 12.5% of the teachers reported no background in computer science.
14) the background of many teachers in computer is alarmingly limited.
15) most high schools offer word processing to business students but few offer it to college prep students.
16) most districts purchase most of their software.
17) most districts do not use their computer facilities for administrative purposes.
18) most districts receive little or no outside guidance or help with their programs.

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